

WHAT IS CLAIMED IS:

- 1 1. A wavelength converter comprising:
 - 2 a first semiconductor laser for outputting light with
 - 3 a constant intensity and with a first wavelength forming
 - 4 a wavelength to be obtained when a signal light is
 - 5 inputted to said wavelength converter and undergoes
 - 6 wavelength conversion in said wavelength converter;
 - 7 a first semiconductor optical amplifier for
 - 8 intensity-modulating the output light with said first
 - 9 wavelength from said first semiconductor laser through
 - 10 the use of the inputted signal light so that the output
 - 11 light falls into an opposite phase condition with respect
 - 12 to the inputted signal light;
 - 13 a second semiconductor laser for outputting a light
 - 14 with a constant intensity and with a second wavelength
 - 15 different from that of the inputted signal light and that
 - 16 of the output light from said first semiconductor laser;
 - 17 a second semiconductor optical amplifier for
 - 18 intensity-modulating the output light with said second
 - 19 wavelength from said second semiconductor laser
 - 20 through the use of the inputted signal light so that the
 - 21 output light falls into an opposite phase condition with
 - 22 respect to the inputted signal light;
 - 23 a first filter for extracting a light with said second
 - 24 wavelength from the output light from said second

25 semiconductor optical amplifier;
26 a third semiconductor optical amplifier for
27 intensity-modulating the output light with said first
28 wavelength from said first semiconductor laser through
29 the use of said light with said second wavelength
30 extracted through said first filter so that the output
31 light falls into an opposite phase condition with respect
32 to said second-wavelength light;
33 multiplexing means for multiplexing the output
34 lights from said first and third semiconductor optical
35 amplifiers; and
36 a second filter for extracting a light with said first
37 wavelength from a multiplexed light from said
38 multiplexing means.

1 2. The wavelength converter according to claim 1,
2 further comprising optical phase adjusting means
3 interposed between said third semiconductor optical
4 amplifier and said multiplexing means to adjust a phase
5 of the output light from said third semiconductor optical
6 amplifier for adjusting a phase difference between the
7 output light from said first semiconductor optical
8 amplifier and the output light from said third
9 semiconductor optical amplifier.

1 3. The wavelength converter according to claim 1,
2 further comprising an optical intensity adjusting unit
3 interposed between said third semiconductor optical
4 amplifier and said multiplexing means to adjust an
5 optical intensity of the output light from said third
6 semiconductor optical amplifier with respect to the
7 output light from said first semiconductor optical
8 amplifier.

1 4. The wavelength converter according to claim 3,
2 further comprising:
3 an opto-electric converter for receiving the
4 inputted signal light to convert the inputted signal light
5 into an electric signal; and
6 a control circuit responsive to said electric signal
7 from said opto-electric converter to monitor an average
8 photoelectric power of the inputted signal light for
9 controlling said optical intensity adjusting unit on the
10 basis of said average photoelectric power of the inputted
11 signal light for adjusting the optical intensity of the
12 output light from said third semiconductor optical
13 amplifier.

1 5. The wavelength converter according to claim 3,
2 further comprising:

3 a third filter for extracting a light with said first
4 wavelength from the output light from said first
5 semiconductor optical amplifier;

6 an opto-electric converter for receiving the
7 extracted light from said third filter to convert the
8 extracted light into an electric signal;

9 a peak detection circuit for receiving the
10 converted electric signal outputted from said
11 opto-electric converter to detect a lower-base intensity
12 level of the converted electric signal, and

13 a control circuit for receiving the lower-base
14 intensity level of the converted electric signal to
15 monitor a lower-base intensity level of the output light
16 with said first wavelength from said first
17 semiconductor optical amplifier for controlling said
18 optical intensity adjusting unit on the basis of said
19 lower-base intensity level of the output light with first
20 wavelength to adjust the optical intensity of the
21 output light from said third semiconductor optical
22 amplifier.

1 6. The wavelength converter according to claim 3,
2 further comprising:

3 an opto-electric converter connected to said second
4 filter for receiving the extracted light with said first

5 wavelength from said second filter to convert the
6 extracted light into an electric signal;
7 a peak detection circuit for receiving the converted
8 electric signal outputted from said opto-electric
9 converter to detect a lower-base intensity level of the
10 converted electric signal, and
11 a control circuit for receiving the lower-base
12 intensity level of the converted electric signal to
13 monitor a lower-base intensity level of the output light
14 with said first wavelength from said first semiconductor
15 optical amplifier for controlling said optical intensity
16 adjusting unit on the basis of said lower-base intensity
17 level of the output light with first wavelength to adjust
18 the optical intensity of the output light from said third
19 semiconductor optical amplifier.

1 7. The wavelength converter according to claim 1,
2 further comprising:

3 a third semiconductor laser for outputting a light
4 with a constant intensity and with a third wavelength;
5 second multiplexing means connected to said third
6 semiconductor optical amplifier and further connected to
7 said first to third semiconductor laser for multiplexing
8 the output lights from said first to third semiconductor
9 lasers, with the multiplexed light with said first to

10 third wavelengths being inputted to said third
11 semiconductor optical amplifier.

1 8. The wavelength converter according to claim 7,
2 further comprising:
3 an opto-electric converter for receiving the
4 inputted signal light to convert the inputted signal light
5 into an electric signal; and
6 a control circuit responsive to said electric signal
7 from said opto-electric converter to monitor an average
8 photoelectric power of the inputted signal light for
9 controlling said optical intensity adjusting unit on the
10 basis of said average photoelectric power of the inputted
11 signal light for adjusting the optical intensity of the
12 output light from said third semiconductor optical
13 amplifier.

1 9. The wavelength converter according to claim 7,
2 further comprising:
3 a third filter for extracting a light with said first
4 wavelength from the output light from said first
5 semiconductor optical amplifier;
6 an opto-electric converter for receiving the
7 extracted light from said third filter to convert the
8 extracted light into an electric signal;

9 a peak detection circuit for receiving the converted
10 electric signal outputted from said opto-electric
11 converter to detect a lower-base intensity level of the
12 converted electric signal, and
13 a control circuit for receiving the lower-base
14 intensity level of the converted electric signal to
15 monitor a lower-base intensity level of the output light
16 with said first wavelength from said first semiconductor
17 optical amplifier for controlling said optical intensity
18 adjusting unit on the basis of said lower-base intensity
19 level of the output light with first wavelength to adjust
20 the optical intensity of the output light from said third
21 semiconductor optical amplifier.

1 10. The wavelength converter according to claim 7,
2 further comprising:
3 an opto-electric converter connected to said
4 second filter for receiving the extracted light with said
5 first wavelength from said second filter to convert the
6 extracted light into an electric signal;
7 a peak detection circuit for receiving the
8 converted electric signal outputted from said
9 opto-electric converter to detect a lower-base intensity
10 level of the converted electric signal, and
11 a control circuit for receiving the lower-base

12 intensity level of the converted electric signal to
13 monitor a lower-base intensity level of the output light
14 with said first wavelength from said first
15 semiconductor optical amplifier for controlling said
16 optical intensity adjusting unit on the basis of said
17 lower-base intensity level of the output light with first
18 wavelength to adjust the optical intensity of the
19 output light from said third semiconductor optical
20 amplifier.

1 11. The wavelength converter according to claim 1,
2 wherein a portion of or all of the components of said
3 wavelength converter are formed on a semiconductor
4 substrate in an integrated condition.

1 12. The wavelength converter according to claim 1,
2 wherein said first semiconductor laser is a
3 wavelength-variable type laser.

1 13. An optical cross connect system comprising:
2 a wavelength-demultiplexing type optical filter
3 for demultiplexing a multiplexed optical signal with a
4 plurality of wavelengths into a plurality of optical
5 signals each having the corresponding wavelength;

6 a plurality of wavelength converters connected to
7 said wavelength-demultiplexing type optical filter for
8 receiving said plurality of optical signals as inputted
9 signal lights, each of said wavelength converters
10 including:

11 a first wavelength-variable type
12 semiconductor laser for outputting a light with a
13 constant intensity and with a first wavelength forming
14 a wavelength to be obtained when the corresponding
15 inputted signal light undergoes wavelength conversion
16 in this wavelength converter;

17 a first semiconductor optical amplifier for
18 intensity-modulating the output light with said first
19 wavelength from said first semiconductor laser through
20 the use of the inputted signal light so that the output
21 light falls into an opposite phase condition with
22 respect to the inputted signal light;

23 a second semiconductor laser for outputting
24 a light with a constant intensity and with a second
25 wavelength different from that of the inputted signal
26 light and that of the output light from said first
27 semiconductor laser;

28 a second semiconductor optical amplifier for
29 intensity-modulating the output light with said second
30 wavelength from said second semiconductor laser

31 through the use of the inputted signal light so that the
32 output light falls into an opposite phase condition with
33 respect to the inputted signal light;

34 a first filter for extracting a light with said
35 second wavelength from the output light from said
36 second semiconductor optical amplifier;

37 a third semiconductor optical amplifier for
38 intensity-modulating the output light with said first
39 wavelength from said first semiconductor laser through
40 the use of the light with said second wavelength
41 extracted through said first filter so that the output
42 light falls into an opposite phase condition with
43 respect to the second-wavelength light;

44 multiplexing means for multiplexing the
45 output lights from said first and third semiconductor
46 optical amplifiers; and

47 a second filter for extracting a light with
48 said first wavelength from a multiplexed light from
49 said multiplexing means; and

50 an optical coupler for multiplexing the extracted
51 lights outputted from of said second filters of said
52 plurality of wavelength converters.